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EXAMINER	
MILLER, MARINA I	

ART UNIT	PAPER NUMBER
1631	

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/815,102	CONWAY, ANDREW A.	
	Examiner	Art Unit	
	Marina Miller	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-18 and 20-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-18 and 20-23* is/are rejected.

7)☒ Claim(s) *10 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/18/2006 has been entered.

Claims 1-8, 10-18, and 20-23 are pending.

Claims 9 and 19 are cancelled.

Claims 1-8, 10-18, and 20-23 are presently under examination.

Applicants' arguments have been fully considered. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are applied.

Claim Objections

Claims 10 and 20 are objected to because of the following informalities: claims 10 and 20 currently depend from claims 9 and 19, which were cancelled. Appropriate is required to correct the dependency of claims 10 and 20. For purposes of further examination, claims 10 and 20 will be interpreted as if they depend from claims 6 and 16, respectively

Claim Rejections - 35 USC § 101

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-8, 10-18, and 20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The instant claims were previously rejected as being directed to non-statutory subject matter. Applicants amended the claims and argue that the claims recite tangible expression of the determination of the region of markers because the amended claims recite "identifying at least one particular said region of markers."

In response to the arguments, it is noted that the result of the instant method is identifying a particular region of markers having the next-to-highest result of a computed function. The amended claims still do not recite tangible expression of the identification of the region of markers. Specifically, the claims recite mathematical/statistical manipulations of data (*e.g.*, scores, functions, genotype data), which are performed by a computer (line 8 of claim 1, line 25-26 of claim 11). The result of the method (*i.e.*, identifying a region) may be stored on a computer in a form and/or file that is not necessarily accessible to a user. Also, the claims do not recite providing or outputting the result to a user. The examiner maintains that claims 1-8, 10-18, and 20 do not recite tangible expression of identifying a region having the next-to-highest result of a computed function, and therefore the rejection is also maintained.

Claim Rejections - 35 USC § 112

New Matter

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-8, 10-20, and 22-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a NEW MATTER rejection.

Claim 1, as amended, recites the limitation "assigning to said marker a first computer function of the first merged score and the second merged score." However, the newly recited limitation does not have support in the specification, claims, or drawings, as originally filed. Applicants point to pages 17-19 of the originally filed disclosure for support for the claim amendments. The specification on pp. 17-19 discloses a probability of observing the measured value for markers and computing a ratio of probabilities under different assumptions. However, the specification does not disclose "*assigning* a first computed *function* of the first merged score and the second merged score to markers."

Claim 1, as amended, recites the limitation "second assigning to each one of a plurality of sequential regions of markers a second computed function of those markers in each particular sequential region." However, the newly recited limitation does not have support in the specification, claims, or drawings, as originally filed. Applicants point to pages 19-21 of the originally filed disclosure for support the claim amendments. The specification on p. 19-21 discloses that the merged scores are examined to find a run of high scores, and that known techniques exist for finding a consecutive region with the highest sum in an array of numbers. Page 20 further discloses a sequence of commands for obtaining the "best region" on a chromosome. However, the specification does not disclose "second assigning to each one of a

plurality of sequential regions of markers a *second computed function* of those markers in *each* particular sequential region."

Claim 1, as amended, recites the limitation "identifying ... particular said region of markers in response to a result of said steps of second assigning, said ... region of markers having an assigned result of said computed function that is ... the next-to-highest result of said computed function." However, the recited limitation does not have support in the specification, claims, or drawings, as originally filed. Applicants point to pages 13-14 of the originally filed disclosure for support for the claim amendments. The specification discloses on p. 13-14 sequencing of an identified region that is likely to contain a disease allele. The specification also discloses on page 20 that the next-highest run of scores may be determined. Figure 3 and page 19 disclose examining the merged scores to find a run of high scores and a consecutive region with the highest sum in an array of numbers. However, the specification does not disclose identifying anything in response to assigning a second computed function and does not disclose a region of markers having an assigned result of a computed function. The specification does not disclose the next-to-highest result of the computed function, but only discloses determining a region of markers having a highest or next-to-highest run of merged scores.

For these reasons, the claims are rejected for reciting new matter.

Enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentations is "undue." These factors include, but are not limited to:

a) The breadth of the claims;
b) The nature of the invention;
c) The state of the prior art;
d) The level of one of ordinary skill;
e) The level of predictability in the art;
f) The amount of direction provided by the inventor;
g) The existing of working examples; and
h) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

The Board also stated that although the level of skill in molecular biology is high, the results of experiments in genetic engineering are unpredictable. 858 F.2d at 740. While all of these factors are considered, sufficient amount for a prima facie case are discussed below.

Claims 1-8, 10-18, and 20-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

a) The claims are broad because they are drawn to a method for determining a likely genetic region for a recessive disease comprising steps of obtaining and analyzing actual genotype data for a population of affected people and/or their parents and obtaining and analyzing estimated genotype data for the population. A group of people composing "the population" for estimated genotype data may be reasonably interpreted as comprising the

affected people and/or their parents OR the population at large (*i.e.*, unaffected population or the entire inbred population) (*see* the rejection under 35 U.S.C., 112, second paragraph). The instant specification does not provide specific guidance to practice the invention because it does not disclose how to identify a region of markers wherein estimated genotype data are obtained for the affected population. Specifically, if actual and estimated genotype data are both obtained for the affected population, then the method cannot be performed because markers cannot be classified/compared as exhibiting a pair of alleles more frequently than would occur randomly and markers cannot be scored. Without knowing what population(s) is/are used, analyzing the genotype data, determining scores, and identifying a region of markers wherein markers are statistically different would require undue experimentation.

Further, the step of analyzing estimated and actual genotype data comprises determining a set of scores under various assumptions for the genotype data relative to each person for which actual genotype data was determined, merging the scores under different assumptions, assigning computed functions, and identifying a region of markers in response to a result that is the next-to-highest result. The recited steps of analyzing do not actually compare affected and unaffected populations. In fact, it is not even clear what genotype data is used for determining a set of scores (*see* the rejection under 35 U.S.C., 112, second paragraph). The instant specification does not provide specific guidance to practice the invention because it does not disclose how to classify markers without comparing the affected and unaffected population. Without a comparison of data obtained from BOTH affected and unaffected populations, steps of analyzing genotype data and determining scores of markers would require undue experimentation.

Even if it is assumed that one analyzes genotype data of the affected population and estimated genotype data of the population at large, determines a set of scores for the markers in the affected population, and merges the scores under "autozygous/not autozygous" assumptions, the specification still does not provide specific guidance to practice the invention because it does not disclose how to assign computed functions to markers, how to determine a plurality of sequential regions of markers and how to assign a computed function to the plurality of regions, and how to identify a region of markers in response to some value which is "the next-to-highest value." Specifically, the specification does not provide guidance for how to assign "a computed function of merged scores" to markers and how to assign "a computed function to a plurality of sequential regions of markers," *i.e.*, parameters of the assignment are not disclosed in the specification. The specification also does not disclose how to create or pick a plurality of sequential regions of markers from randomly picked markers, wherein only markers' scores have been determined (*see* the step of determining a set of scores recited in claims 1, 11, and 21).

Without knowing how to assign computed functions (parameters of the assignment), identifying a cluster of markers would require undue experimentation.

Also, the specification does not disclose how to identify a cluster of markers in response to the second assignment wherein some value is the next-to-highest value. Specifically, the specification does not disclose how to determine a "response" to a result and does not disclose the steps of the first and second assigning. The specification also does not disclose how to assign the next-to-highest result of an unknown computed function. Without knowing parameters of the assignment and identification (*i.e.*, a region of markers is identified *as what*), a connection

between the region and the computed function and its result (and what the result is), identifying a region of markers would require undue experimentation.

The goal of the method is to determine a likely genetic region for a recessive disease. However, the method steps only classify markers and a plurality of markers, wherein the result of the method is identifying some region of markers that is connected to markers' scores under curtain assumptions and is the next-to-highest of some value. There is no indication that the identified region of markers IS connected to a recessive genetic disease. Therefore, the method does not actually achieve its goal. The specification does not provide specific guidance to practice the invention because it does not disclose how to determine a likely genetic region for a recessive disease from the region of markers that has some next-to-highest result. Without knowing the connection between a region of markers, a result, and a recessive disease, determining a likely region for a recessive trait would require undue experimentation.

To conclude, it is noted that the specification only discloses that homozygous markers are chosen and scores are generated for each marker, wherein the score represents a probability that the genotype measured for a person would actually be measured, given some assumptions. The specification further discloses merging probabilities (multiplying scores) under different assumptions and computing a maker score which is a ratio of probabilities. The specification also discloses that scores can be arrayed in accordance with the order of the marker on chromosomes and a consecutive run of scores with the highest and the next-to-highest sum in the array numbers can be found by using existing techniques (p. 17-20). It is further noted that none of the disclosed method steps regarding probability determinations or arrays are recited in the claims.

The limitations that *are* recited are not disclosed in the specification, and the specification does not teach how to perform the recited steps.

b) The invention is drawn to a method for determining a likely genetic region for a recessive disease.

c,e) While prior art analysis shows that genotype data of an affected and unaffected population is compared in order to conduct homozygosity mapping (*i.e.*, to locate a region causing a rare recessive trait) , the instant claims do not recite using genotype data from two populations and comparing the two populations. Thus, without any recitation of the specific type of populations and steps of comparing populations, the claims are not enabled by the prior art.

Specifically, the prior art of Arbour (*Human Mol. Genet.*, 6(5):689-694 (1997) teaches using affected and unaffected members of a population for comparing genotype data in homozygous mapping (abstract and p. 690, right col.). The prior art of Kruglyak (*Am. J. Hum. Genet.*, 56:519-527 (1995) (p. 523, right col.) and Puffenberger, US 2005/0158754 (p. 11), also teach homozygous mapping using genotype data from the affected and unaffected population and comparing the data. The instant claims do not recite comparing genotype data for differing populations.

Further, the prior art of Arbour discloses identifying loci which were homozygous in affected individuals, determining genetic markers which displayed a shift toward homozygosity in the affected DNA, compared to the unaffected DNA pool, and genotyping individuals using the identified markers. Arbour discloses using likelihood (LOD) scores, merging and ranking the scores, and determining markers according to scores (*see* p. 689-691). Arbour discloses that identified markers are linked to a disease. The instant claims recite steps that are not found in the

prior art, and do NOT recite steps that are disclosed by the prior art, therefore the claims are not enabled by the prior art.

d) The skill of those in the art of molecular biology and bioinformatics is high.

f) The specification does not provide any working examples and does not teach how to make and use the instant method and the system without knowing what population(s) to use for obtaining genotype data and without comparison of genotype data from different populations; does not teach how to assign computed functions or what functions are assigned; how to choose a plurality of regions of markers; parameters of identifying or what values are the highest and next-to-highest; nor does it teach how to "connect" of a region of markers and a recessive disease.

h) In order to practice the claimed invention, one skilled in the art must randomly select genotype data and must guess which data to use for analyzing and determining scores. One further must randomly select parameters of the assignment and guess what computed function to use for identifying a plurality of regions of markers and identifying a region and must randomly pick some parameter for which a value is "next-to highest." One also must guess about the connection of the identified region and a recessive disease. This constitutes undue experimentation.

Due to the undue experimentation required to obtain the goal of the invention, the lack of directions presented in the specification, the complex nature of the invention, and the state of the prior art showing that comparing genetic data of two population and establishing the connection between a recessive disease and markers, the specification fails to teach one skilled in the art how to use the claimed method for determining a likely genetic region for a recessive trait.

Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-8, 10-18, 20, and 22-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites obtaining actual genotype data for affected people with the genetic disease in a population and estimated genotype data for the population. It is not clear for what population the estimated genotype data are obtained, e.g., the population at large, the population of the affected people, the population of parents, or the population of affected people and their parents. *See also* the rejection under 35 U.S.C. 112, first paragraph. As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 1 and 11 each recite in the preamble that the goal of the method is "to determine likely genetic regions for a recessive genetic disease." The method steps are directed only to provide an algorithm for classifying markers and a plurality of markers, wherein the result of the method is identifying some region of markers that is connected to markers' scores under curtain assumptions. The method steps do not achieve the goal recited in the preamble, because there is no indication that the identified region of markers IS connected to a recessive genetic disease. Thus, the intended relationship between the preamble and the method steps is unclear and, therefore, claims 1-8, 10-20, and 22-23 are indefinite.

Claim 1, as amended, recites "estimated" genotype data. The limitation makes the claim vague and indefinite because the criteria of the "estimation" (*i.e.*, what the genotype data are estimated for) are not clear, and neither the specification nor the claims defines the limitation. As the intended limitation is not clear, claim 1 is indefinite. Claims 2-8, 10, and 22 depend from claim 1, and therefore are also indefinite.

Claims 1 and 11, as amended, recite the limitation "assigning to said marker a first computed function of ... merged score ... indicating ... a statistical distinction." It is not clear what a "computed function" is intended to mean, *e.g.*, an algorithm for calculating statistically significant difference, a value of merged scores determined by using a function/algorithm, *etc.* The criteria/parameters of "assigning a function to markers" are also unclear. *See also* the rejection under 112, first paragraph. As the intended limitation is not clear, claims 1-8, 10, and 22 are indefinite.

Claims 1 and 11, as amended, recite the limitation "assigning to ... regions of markers a second computed function ... being responsive to said steps of first assigning." It is not clear what "second computed function" is intended to mean, *e.g.*, an algorithm, a value, *etc.* The criteria/parameters of "assigning a function to a plurality of regions of markers" are also unclear. The specification only discloses that the merged scores are examined to find a run of high score and a technique for finding a consecutive region with the highest sum in an array of numbers. Neither the specification nor the claim defines "assigning to ... regions of markers a second computed function."

The limitation a "function being responsive to steps" is further not clear because criteria of "responsiveness" are not clear, *e.g.*, a second function uses data obtained from a first function, parameters of a second function depend from the parameters of a first function, *etc.*

It is also not clear what "steps of first assigning" are intended because "first assigning" is a step, which does not comprise any additional sub-steps.

As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 1 and 11, as amended, recite the limitation "identifying ...said region of markers in response to a result of said steps of second assigning." It is not clear what "identifying in response to" is intended to mean, *e.g.*, a specific algorithm is applied to data obtained from/by a second assigning, a result of a second assigning *is* an identified region, *etc.*

It is further unclear what is intended to be "a *result* of a second assigning," *e.g.*, a value, region, score, *etc.* The result of the assignment is neither recited in the claims nor defined by the specification.

It is also unclear what "*steps* of second assigning" are intended because the step of second assigning does not comprise any sub-steps.

As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 1 and 11 recite the limitations a "region of markers having an assigned result of said computed function" and "the ... result of said computed function." It is not clear what "result of a computed function" is intended because it is not clear what is intended to be "a computed function" (*see above*). It is further unclear what "assigned result" is intended, *e.g.*, a

result of assigning a computed function to markers, assigning a result of a function which is computed for markers, *etc.* The parameters of assigning are also unclear.

The antecedent basis for the limitation "said computed function" recited in line 27 of claim 1 and line 14 of claim 11 is also unclear because both claims 1 and 11 recite a first and a second computed function.

As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 1 and 11 recite the limitation obtaining actual genotype data, obtaining estimated genotype data, and analyzing the actual and estimated genotype data. Claims 1 and 11 further recite sub-steps of analyzing, *i.e.*, determining a set of scores ... for each marker in the genotype data relative to each person for which actual genotype data was determined.

First, claims 1 and 11 recite actual and estimated genotype data, and therefore the antecedent basis for the limitation "the genotype data" recited in the sub-step of determining is not clear. Specifically, it is not clear whether the limitation "the genotype data relative to each person for which actual genotype data was determined" is related to the actual, the estimated, or both genotype data.

Second, the relationships between the step of "analyzing" and the steps by which the analyzing is performed (*i.e.*, determining, merging, a first and second assigning, and identifying) are not clear. Specifically, it is not clear what bearing the limitation recited in "analyzing" (*i.e.*, to find a region of the affected people that includes markers exhibiting particular homozygous pairs of alleles ....) has on the steps by which analyzing is performed. *See also* the rejection under 35 U.S.C. 112, first paragraph.

As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 1 and 11 recite the limitation "substantially at least the next-to-highest." The limitation makes the claims vague and indefinite because the metes and bounds of the claims are not clear. Specifically, it is not clear whether the "substantially at least the next-to-highest result" encompasses, for example, the highest and a second, as well as a third (and possibly a fourth, and fifth...) highest result. For the sake of comparison, the limitation "at least next-to-highest," would be interpreted to encompass the highest and next-to-highest result, but normally would not be interpreted to also comprise a third- or fourth-highest result. As the intended limitation is not clear, claims 1-8, 10-20, and 22-23 are indefinite.

Claims 4 and 14 recite the limitation "a score for a marker." The antecedent basis for the limitation "a score" is unclear because claim 4 depends from claims 1-3 and claim 14 depends from claims 11-13, wherein claims 1 and 11 recite a set of scores, a first merged score, and a second merged score. Further, the antecedent basis for the limitation "a marker" is also unclear because claims 1 and 11 recite "markers", "each marker", and "the marker", and therefore it is not clear what marker is intended in claims 4 and 14. As the intended limitation is not clear, claims 4-8 and 14-18 are indefinite.

Claims 5 and 15 recite the limitation "a marker". The antecedent basis for the limitation "a marker" is unclear because claim 5 depends from claim 4 and claim 15 depends from claim 14, wherein claims 4 and 14 recite "a marker". Further, claim 5 depends from claims 1-3 and claim 15 depends from claims 11-13, wherein claims 1 and 11 recite "markers", "each marker", and "the marker". As the intended limitation is not clear, claims 5-8 and 15-18 are indefinite.

Claims 6 and 16 recite the limitation "wherein the merged scores are placed in an array." Claim 6 depends from claims 1-5 and claim 16 depends from claims 11-15, wherein claims 1 and 11 recite "a first" and "a second" merged score. Therefore, an arrangement of the array is not clear, *e.g.*, both scores are placed in one array randomly/specifically, the first merged score is placed in one array and the second score is placed in another (independent) array, *etc.* As the intended limitation is not clear, claims 6-8 and 16-18 are indefinite.

Groups of claims (7 and 17) and (8 and 18) recite the limitation "identifying ... particular region further comprises determining a consecutive portion of the array that has the highest sum" and ""identifying ... particular region further comprises computing all sums and comparing sums," respectively. Claims 7 and 8 depend from claims 1-6 and 1-7, respectively; claims 17 and 18 depend from claims 11-16 and 11-17, respectively, wherein claims 1 and 11 recite the step of "identifying ... particular region ... said ... region ... having a ... result ... that is ... the next-to-highest result." It is not clear where the additional steps recited in claims (7 and 17) and (8 and 18) fit within the step of "identifying a region" recited in claims 1 and 11. As the intended limitation is not clear, claims 7-8 and 17-18 are indefinite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arbour et al., *Human Mol. Genet.*, 6(5):689-694 (1997), in view of Puffenberger, US 2005/0158754.

Claim 21 was previously rejected over Arbor. Applicants amended the claim which now recites an additional step of sequencing the region of markers that has the highest or next-to-highest run of merged scores. Applicants' arguments are only directed to the amendments which are not recited in claim 21, but only recited in claims 1-8, 10-18, 20, and 22-23.

The examiner maintains that Arbour discloses an apparatus comprising a processor, input/output interfaces, and a memory comprising instructions for performing steps of determining a set of scores, merging the set of scores, and determining a region of markers having a highest or next-to-highest run of scores, as set forth in the previous office action.

Although Arbour discloses genotyping individuals using the identified markers (p. 689, right col.), he does not specifically disclose sequencing the identified region.

Puffenberger discloses a method for autozygous mapping comprising identifying a genomic region of contiguous markers exhibiting the highest sum of scores (LODs) and ranking the scores [0046]-[0052], [0090]-[0099]. Puffenberger further discloses genotyping of a population using the identified homozygous markers [0088]. Puffenberger also discloses sequence analysis of genes in the linked region on chromosome [0046], [0095]-[0099].

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to modify the system of Abrour to sequence the region of markers having the highest run of scores, such as taught by Puffenberger, where the motivation would have been to perform a simple genetic screening for identifying the presence/absence of a mutation within the

identified generic region responsible for a recessive disease, as taught by Puffenberger, [0046]-0053].

Applicant's arguments with respect to claim 21 have been considered but are moot in view of the new ground(s) of rejection set forth above.

Conclusion

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marina Miller whose telephone number is (571)272-6101. The examiner can normally be reached on 8-6, M-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang, Ph. D. can be reached on (571)272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Marina Miller
Examiner
Art Unit 1631

MM

MARJORIE A. MORAN
PRIMARY EXAMINER

Marjorie A. Moran
9/12/06